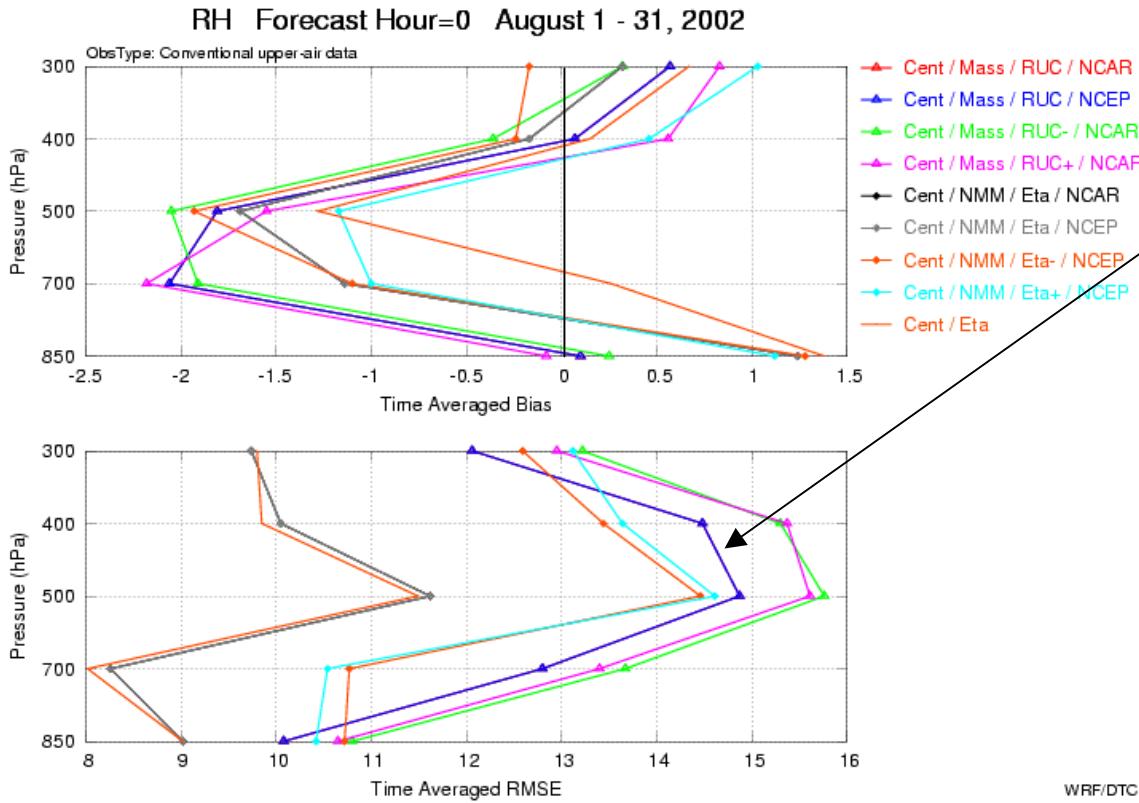


Summary on RH and Precipitation verification of WRF retrospective runs

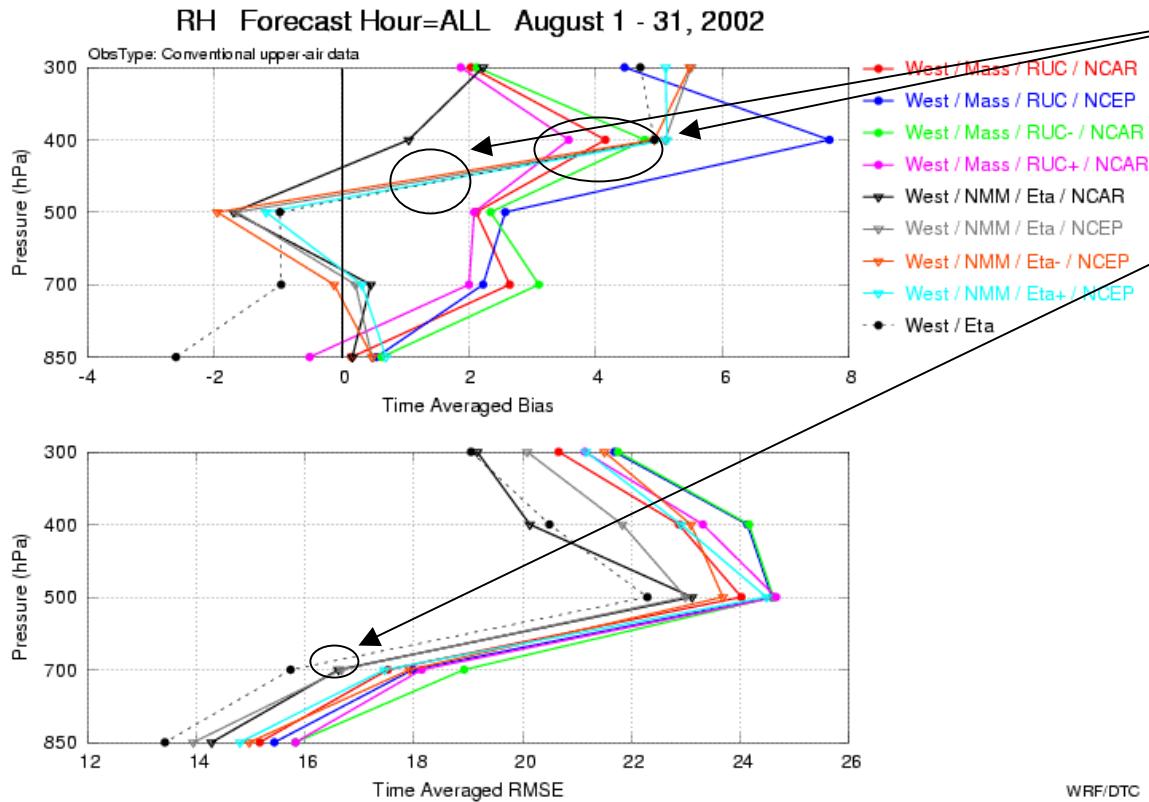
Hui-Ya Chuang and Geoff DiMego
MMB/EMC/NCEP

Initial RH Errors in the Central Domain



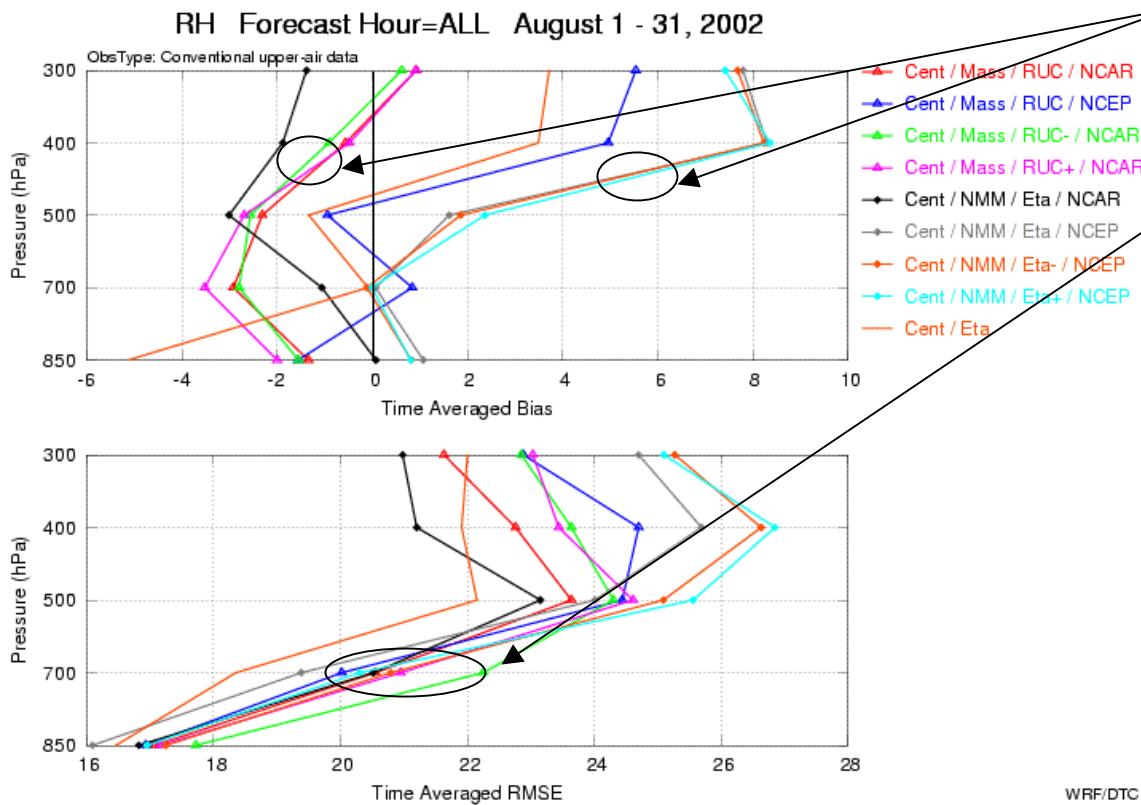
- All models have dry initial biases at 500 and 700 mb.
- NCAR WRF has the largest Initial RH RMS errors at most levels, while its initial temperature, height and wind fields have the least RMS errors.
- The initial RH RMS errors of the breeding pair are larger than their corresponding control runs.

RH Forecast Errors in the Western Domain



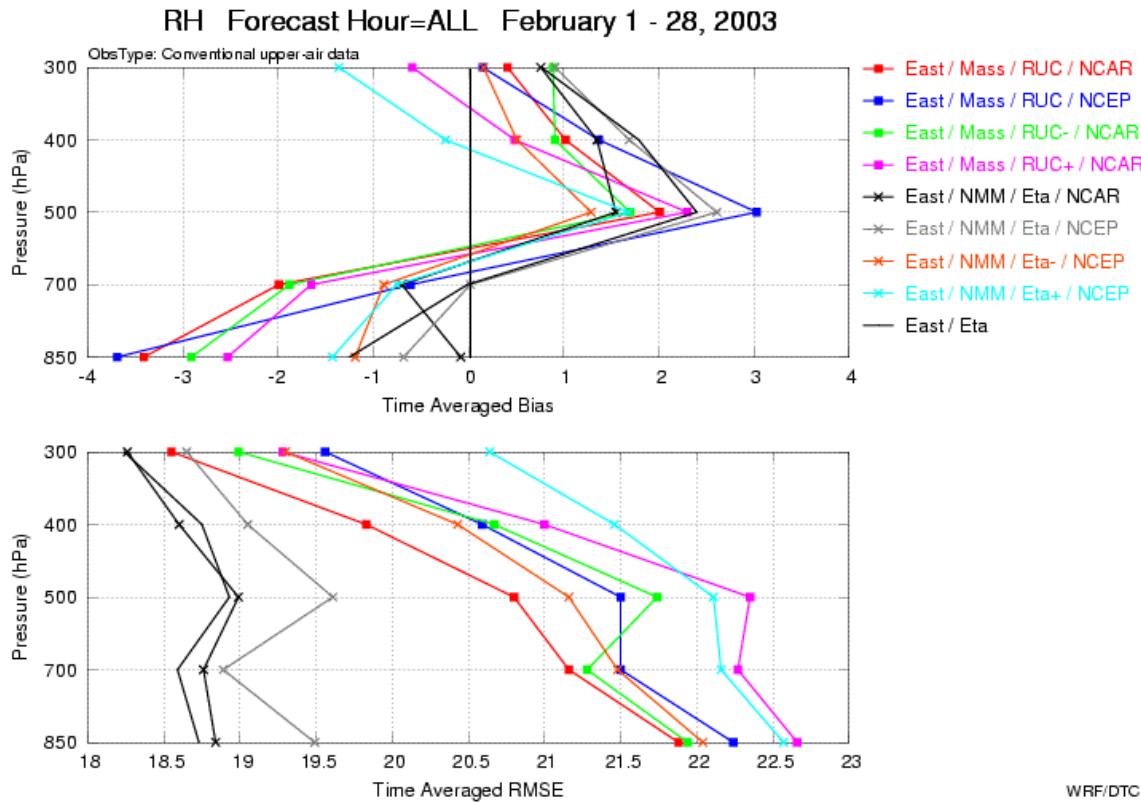
- The RH biases tend to group by physics package for the runs with the same dynamical core.
- The WRF runs with the same dynamical cores have similar RH RMS errors at most levels.
- The breeding pairs have larger RMS forecast errors than the corresponding control run.

RH Forecast Errors in the Central Domain



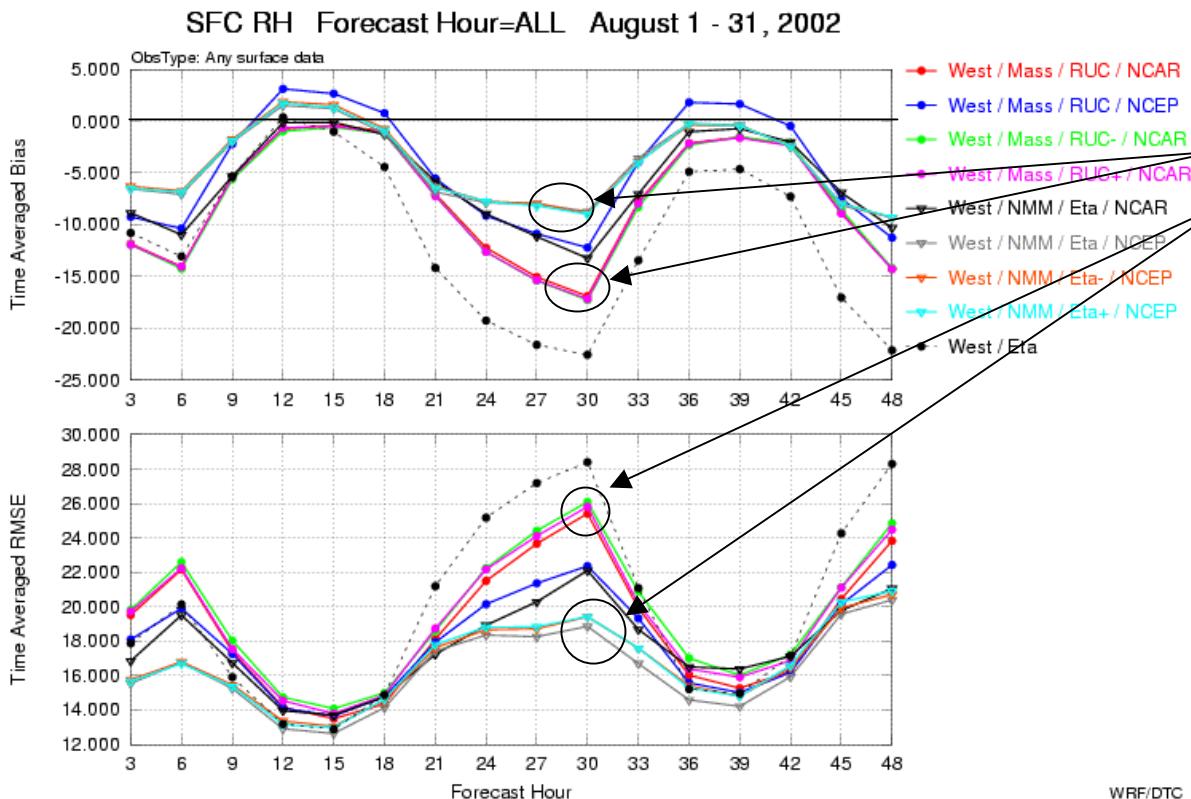
- The RH biases tend to group by physics package for the runs with the same dynamical core.
- Most models have similar RMS errors at 850 and 700 mb in the summer.
- The breeding pairs have larger RMS forecast errors than the corresponding control run.

RH Forecast Errors in the Eastern Domain



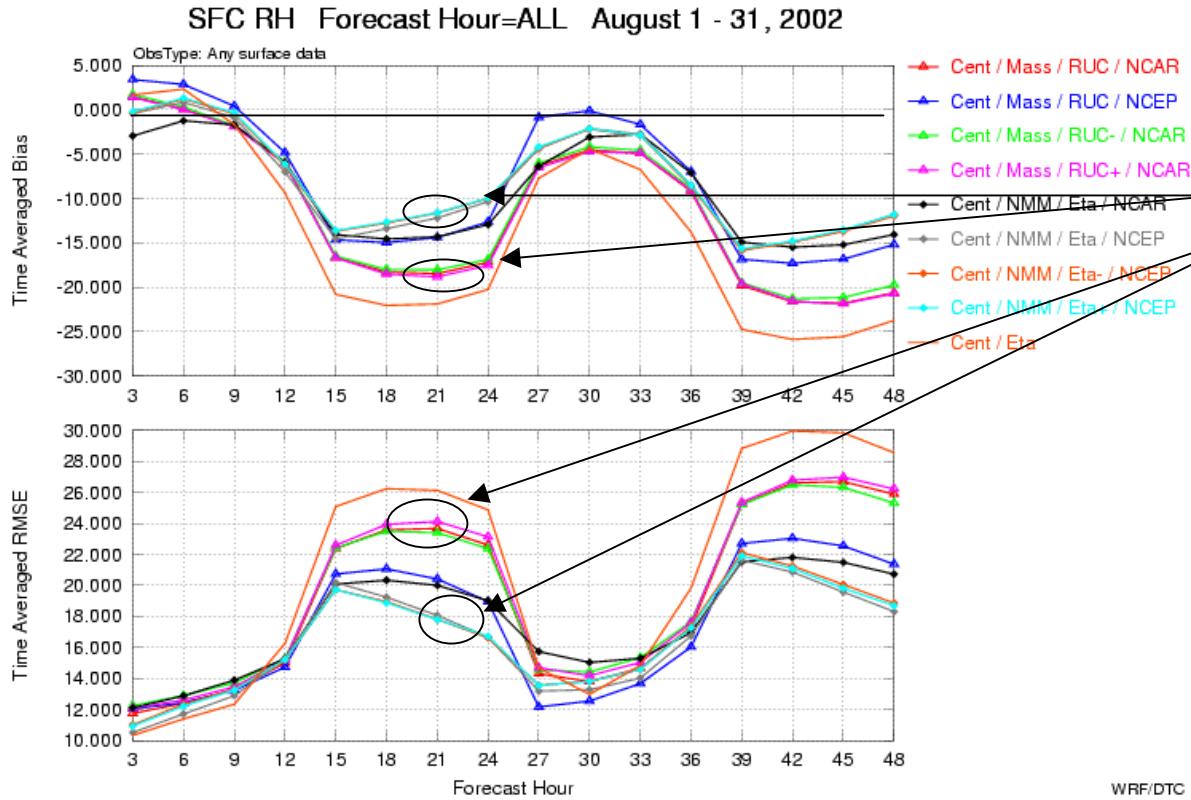
- The RH biases still group by physics package for the runs with the same dynamical core except in the winter.
- The breeding pairs have larger RMS forecast errors than the corresponding control run except for NCAR WRF runs in the winter.

2m RH Forecast Errors in the Western Domain



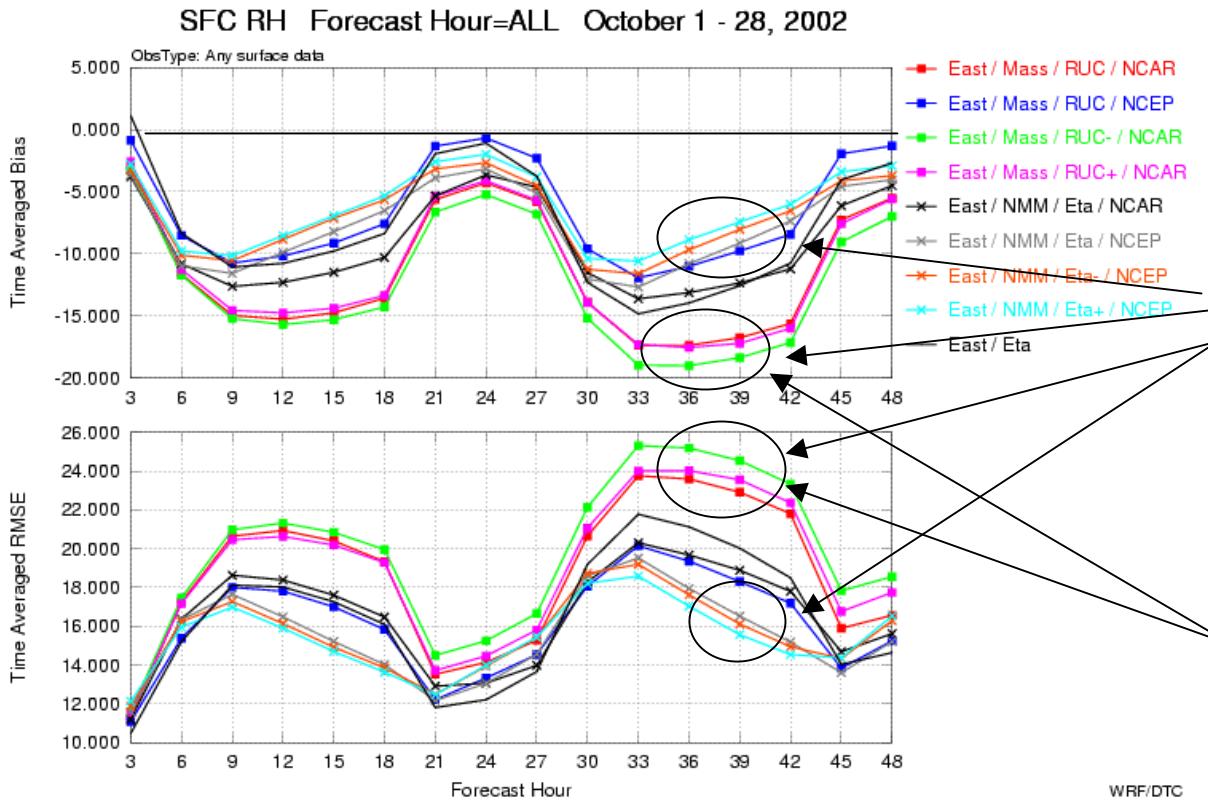
- All models under-predict 2 m RH at night.
- Both 2m RH biases and RMS errors group by physics package for the runs with the same dynamical core.

2m RH Forecast Errors in the Central Domain



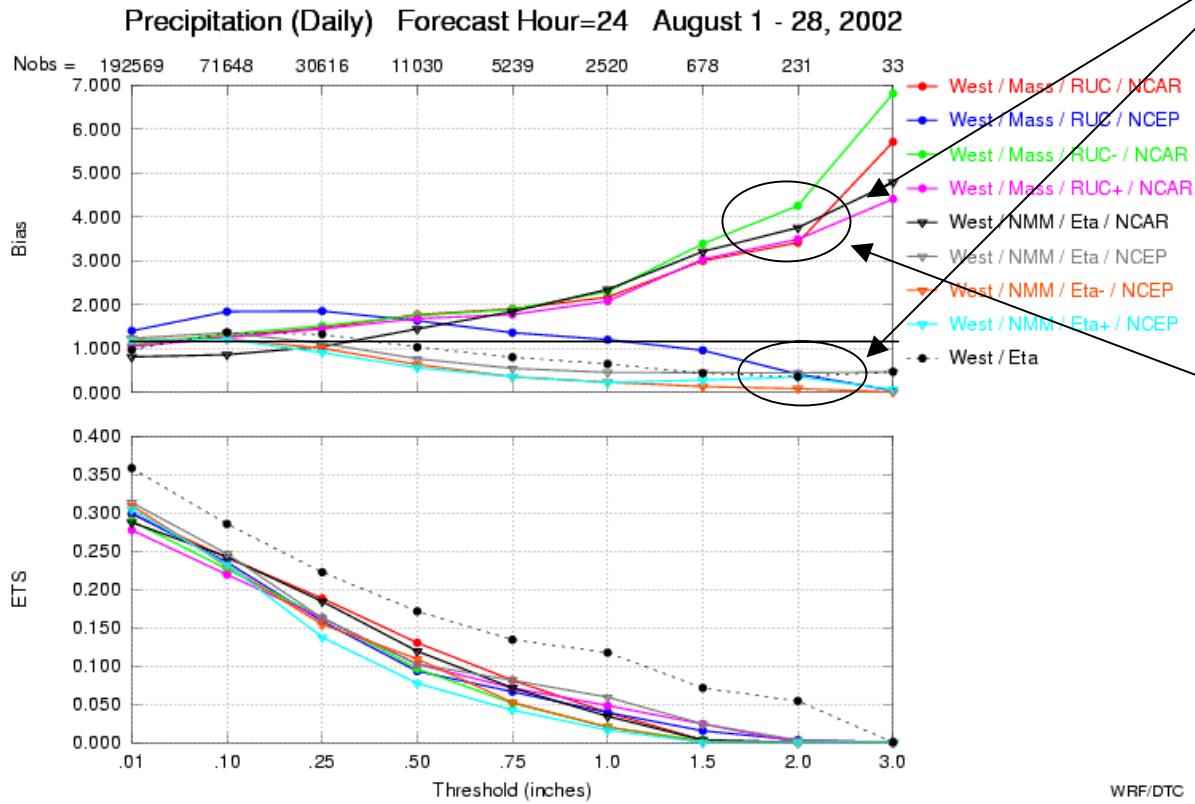
- Most models under-predict 2 m RH at night.
- Both 2m RH biases and RMS errors group by physics package for the runs with the same dynamical core.
- NMM WRF runs with NCEP physics have relatively lower biases and RMS errors.

2m RH Forecast Errors in the Eastern Domain



- Most models under-predict 2 m RH at in the spring and fall but not in the winter.
- Both 2m RH biases and RMS errors group by physics package for the runs with the same dynamical core.
- NCAR WRF runs with NCAR physics package have relatively larger biases and RMS errors in this domain.

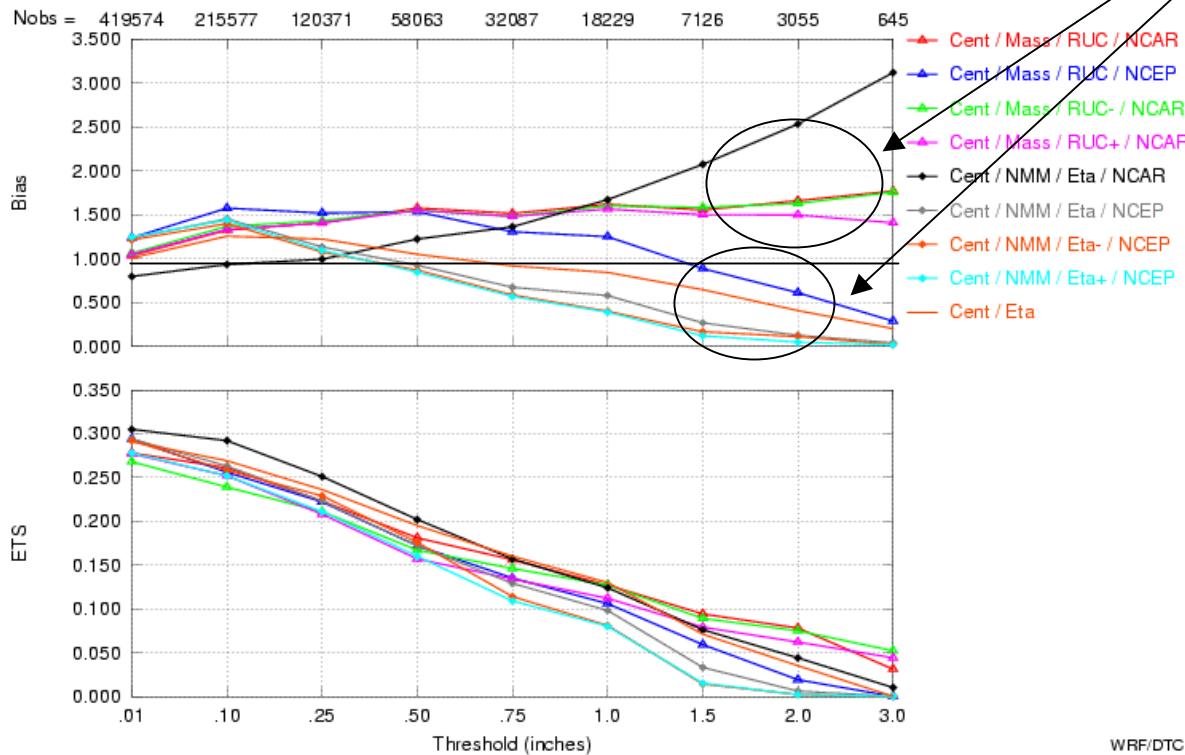
Precipitation Forecast Errors in the Western Domain



- Daily precipitation biases show more similarity for the WRF runs with the same physics package especially in the summer.
- The four WRF runs with NCAR physics package highly over-predict precipitation at high threshold in the summer but not in the winter.
- The Eta model has the best threat scores for most thresholds in this domain.

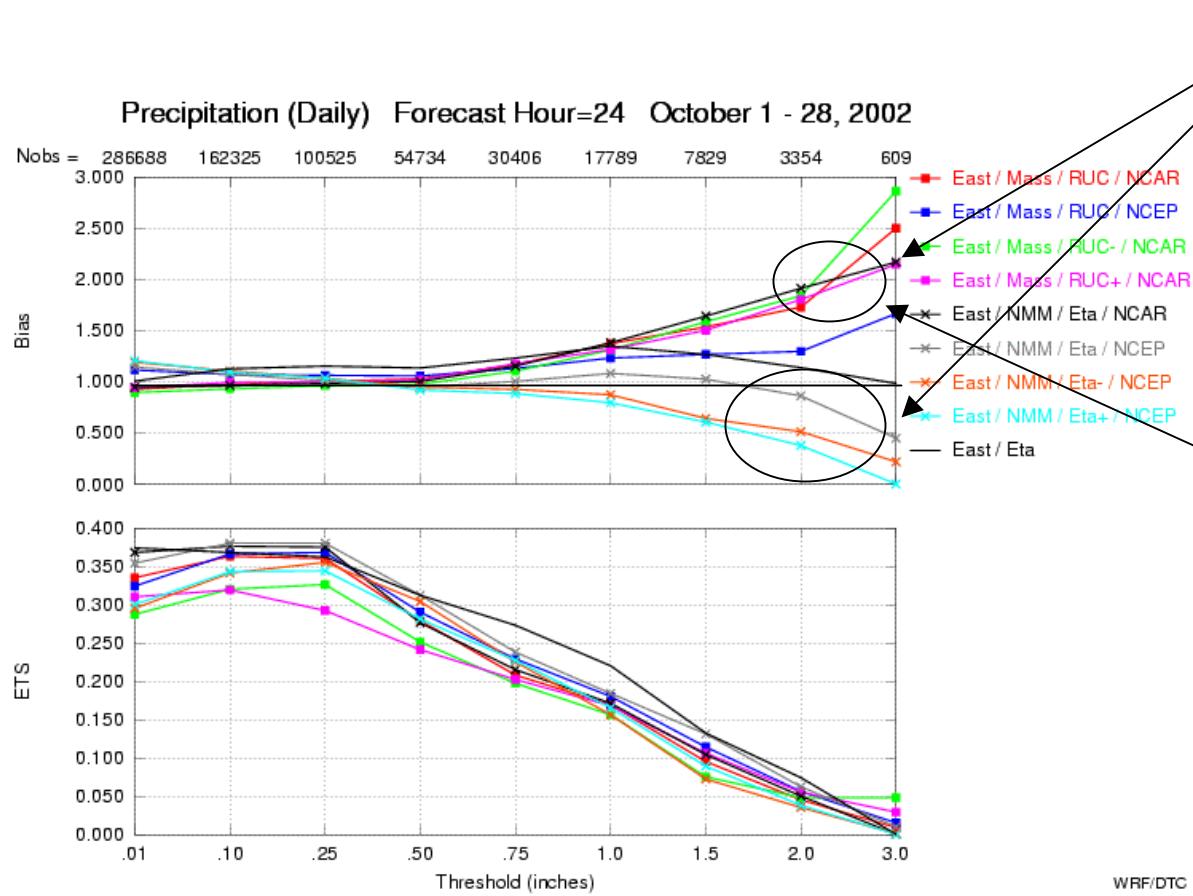
Precipitation Forecast Errors in the Central Domain

Precipitation (Daily) Forecast Hour=24 August 1 - 28, 2002



- Daily precipitation biases still show similarity for the WRF runs with the same physics package.
- The WRF runs with NCAR physics package still over-predict precipitation at high threshold but not as much as in the western domain.
- All models have similar threat scores.

Precipitation Forecast Errors in the Eastern Domain



- Daily precipitation biases still show similarity for the WRF runs with the same physics package except for NCAR physics in the winter.
- The WRF runs with NCAR physics package still over-predict precipitation at high threshold but not as much as in the western domain.
- All models have low biases at low threshold.

Summary

- NCAR WRF runs have the largest Initial RH RMS errors at most levels, while their initial temperature, height and wind fields have the least RMS errors.
- The upper air RH biases usually group by physics package for the runs with the same dynamical core. The only exception is the eastern nest runs in the winter.
- The breeding pairs usually have larger upper air RH RMS forecast errors than the corresponding control run except for NCAR WRF runs in the winter.
- Both 2m RH biases and RMS errors group by physics package for the runs with the same dynamical core.

Summary

- The precipitation verification shows that WRF runs with the same physics package have similar biases except for the runs with NCAR physics package in the winter.
- The WRF runs with NCAR physics package usually over-predict precipitation at high threshold, which is especially pronounced in the western domain.